ROCKY FLATS PLANT, PLUTONIUM RECOVERY AND FABRICATION FACILITY
(Plant C) (Building 771)
North-central section of the Plant
Golden vicinity
Jefferson County
Colorado

HAER No. CO-83-N

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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(Rocky Flats Plant, Building 771)
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Location: Rocky Flats Environmental Technology Site, Highway 93, Golden, Jefferson County, Colorado. Building 771 is located in the north-central section of the Rocky Flats Plant (Plant).

Date of Construction: 1951.

Fabricator: Austin Company, Cleveland, Ohio.

Present Owner: United States Department of Energy (USDOE).

Present Use: Plutonium Recovery Processing.

Significance: This building is a primary contributor to the Rocky Flats Plant historic district associated with the United States (U.S.) strategy of nuclear military deterrence during the Cold War, a strategy considered of major importance in preventing Soviet nuclear attack. Building 771, also known as Plant C, was one of the first four major buildings to be constructed and placed into operation at the Plant. For the first few years of the Plant, Building 771 was the primary facility for plutonium operations. Although plutonium recovery operations occurred at other sites within the Nuclear Weapons Complex, the recovery operations in Building 771 were the most cost effective and efficient. In December 1988, a heat plume from the Building 771 incinerator led United States Environmental Protection Agency (USEPA) officials to believe that illegal operations were being conducted. The USEPA received a warrant to enter the Plant and investigate the allegation. The investigation raised safety concerns at the Plant and ultimately led to the curtailment of nuclear operations at the Plant in 1989.

Historians: D. Jayne Aaron, Environmental Designer, engineering-environmental Management, Inc. (e^2M), 1997. Judy Berryman, Ph.D., Archaeologist, e^2M, 1997.

Project Information:

In 1995, an inventory and evaluation of facilities was conducted at the Plant for their potential eligibility for listing in the National Register of Historic Places. The primary goal of this investigation was to determine the significance of the Cold War era facilities at the Plant in order to assess potential effects of the long-term goals and objectives of the USDOE. These goals and objectives include waste cleanup and demolition. Recommendations regarding National Register of Historic Places eligibility were developed to allow USDOE to submit a formal determination of significance to the Colorado State Historic Preservation Officer for review and concurrence, and to provide for management of historic properties at the Plant.

From this determination and negotiations with the Colorado State Historic Preservation Officer, the Advisory Council, and the National Park Service, a Historic American Engineering Record project began in 1997 to document the Plant's resources prior to their demolition. The Plant was officially listed in the National Register of Historic Places in 1997. The archives for the Historic American Engineering Record project are located in the Library of Congress in Washington, D.C.

Introduction:

The Plant is one of thirteen USDOE facilities that constitute the Nuclear Weapons Complex, which designed, manufactured, tested, and maintained weapons for the U.S. arsenal. The Plant was established in 1951 to manufacture triggers for use in nuclear weapons and to purify plutonium recovered from retired weapons. The trigger consisted of a first-stage fission bomb that set off a second-stage fusion reaction in a hydrogen bomb. Parts were formed from plutonium, uranium, beryllium, stainless steel, and other materials.

A tense political atmosphere both at home and abroad during the Cold War years drove U.S. weapons research and development. By the 1970s, both the U.S. and the Soviet Union maintained thousands of nuclear weapons aimed at each other. These weapons were based on submarines, aircraft, and intercontinental ballistic missiles. Both the North Atlantic Treaty Organization and Warsaw Pact countries in Europe had small nuclear warheads called theater weapons used as part of the Mutually Assured Destruction program. (The Mutually Assured Destruction program acted as a deterrent in that if one side attacked with nuclear weapons, the other would retaliate and both sides would perish.) The final nuclear weapons program at the Plant was the W-88 nuclear warhead for the Trident II missile. This mission ended in 1992 when President Bush canceled production of the Trident II missile.

The Plant was a top-secret weapons production plant, and employees worked with a recently man-made substance, plutonium, about which little was known concerning its chemistry, interactions with other materials, and shelf life. The Historic American Engineering Record documentation effort focuses on four aspects of the Plant and its role in the Nuclear Weapons

Complex: manufacturing operations; research and development; health and safety of workers; and security.

Chronology of Building 771

1951 Construction began on Building 771 in November.

1952 Building 771 was occupied.

1953 The first operations began in Building 771 in May.

1957 On September 11, a glove box fire occurred in the building resulting in the transfer of the plutonium foundry, fabrication, and assembly operations to Building 776/777.

1958 A plutonium recovery incinerator, which was designed and built by Plant personnel, began operations. This prototype functioned like an industrial incinerator and contained a series of filters, scrubbers and heat exchangers designed to purify toxic gases and other byproducts of the burning process. This incinerator was the only one of its kind in the country and perhaps in the world.

1959 The solvent extraction process for plutonium recovery was replaced with the anion exchange process.

1963/64 Building 771A was constructed along the eastern portion of the north wall of Building 771 to increase plutonium production. The new space included offices, a cafeteria, and conference rooms. Processes were expanded to include an americium recovery line, dissolution lines, filtrate recovery, and batching, calcination, and fluorination operations.

1967 An office expansion, known as Building 771B, was added to the western portion of the north wall of Building 771.

1970 An addition was completed on the west side of the building for consolidation of all the maintenance, pipe, sheet metal, and painting activities.

1971 Building 771C (or Building 771 Annex), a drum-handling facility joining Building 771 to Building 774, was completed.

1979 Plutonium recovery operations in Building 771 were discontinued. Building 371 plutonium recovery operations began and were expected to fulfill the plutonium recovery needs of the Plant. Cleanup operations began in Building 771.

1980 Operations restarted in Building 771 due to Building 371 material accountability problems.

1989 Plutonium operations in Building 771 shut down in November as part of an overall plutonium operations shutdown ordered by USDOE.

Building History:

Building 771, also known as Plant C, was one of the first four major buildings to be constructed and placed into operation at the Plant. For the first few years of the Plant, Building 771 was the primary facility for plutonium operations. These operations included the production of plutonium weapons components and recovery of plutonium from recycled materials and residues.

By the mid-1950s, the space within Building 771 was inadequate to support all plutonium operations needed at the Plant. A new weapon design required an increase in the amount of plutonium used, and more complex machining to achieve design specifications. A subsequent increase in recovery operations was expected in response to increased fabrication efforts. A new major production building reflecting the latest design and engineering technology available, Building 776/777, was built in 1957 to support plutonium casting and component fabrication and assembly operations.

On September 11, 1957 prior to the completion of Building 776/777, a fire started in a can of plutonium casting residue in a processing line in Building 771. Security inspectors discovered flames from a burning glove box at around 10:10 p.m. The fire spread to the glove box exhaust filters and main filter plenum on the second floor of the building. The initial fire was under control within 30 minutes of its discovery, but rekindled several times. At approximately 11:00 p.m., flammable vapors collecting in the main exhaust duct exploded, spreading plutonium contamination throughout much of the building. By 2:00 a.m. on September 12, the fire was declared out. No major injuries were reported. The Atomic Energy Commission estimated the damage at $818,000.00.

The explosion of flammable vapor may have contributed to the release of plutonium outside the building. Several methods of scientific analysis estimated a possible release range of 0.35 to 14 grams of plutonium from the building. The offsite release was believed to be approximately one gram (Rockwell International press release, 11/85). Average fallout levels from atmospheric weapons testing (performed from 1945 to 1963) in US soils are about 2 millicuries/square kilometer or 0.0232 grams of plutonium-239 and 0.05 millicuries/square kilometer or 0.000003 grams of plutonium-238 (Agency for Toxic Substance and Disease Registry). (A millicurie is a unit used to measure the amount of radioactivity; 1 millicurie of plutonium-239 weighs 0.0116 grams and 1 millicurie of plutonium-238 weighs 0.00006 grams.) No offsite health effects were identified from the release.

Prior to this fire, water was prohibited in the plutonium areas because of its moderating effect, potentially allowing a criticality event to occur (A criticality is sudden release of energy and radiation when a sufficient amount of fissile material accidentally comes together into a supercritical amount). Water was used to extinguish burning combustible materials possibly contaminated with plutonium (i.e. Plexiglas and ducting materials in the exhaust plenum) without a criticality event or fatal consequences. As a result, during building renovation, standpipes and sprinkler systems were installed in plutonium handling areas. Another result of this fire, which was propagated by flammable material, was that less flammable materials were investigated for use in glove box construction, specifically, a replacement for Plexiglas used for windows.

Because of the damage to Building 771, and because construction of Building 776/777 was nearly complete, some of the plutonium operations started in Building 776/777 immediately following the fire. Much of the original production and fabrication equipment remained in Building 771 to provide supplemental plutonium production capabilities for the Plant. After 1957, Building 771 operations consisted primarily of aqueous plutonium recovery from scrap metal.

Although plutonium recovery operations occurred at other sites within the Nuclear Weapons Complex, the recovery operations in Building 771 had been the most cost effective and efficient. The complex plutonium recovery processes relied as much on the operators' first-hand knowledge of the system as well as on their knowledge of the formulae and procedures. When union workers at the Plant went on strike from July 1 until October 28, 1970, scientists, managers, and previous operational floor workers from around the Plant were transferred to Building 771 to run the recovery processes. Although many of these scientists were considered experts in certain aspects of chemical plutonium recovery, most had only worked in a laboratory setting. These scientists and managers struggled to keep operations running during the strike.

During routine operations in December 1988, a heat plume in the Building 771 incinerator was registered on film by a passing aircraft. Officials with the United States Environmental Protection Agency (USEPA) believed that illegal operations were being conducted. The USEPA used this opportunity to convince authorities to issue a warrant to enter the Plant and investigate the allegation. The investigation raised safety concerns at the Plant and ultimately led to the curtailment of operations at the Plant in 1989.

Building Description:

Building 771 is located in the north-central section of the Plant. The building is constructed mainly of reinforced concrete, with some non-production portions of the building constructed of concrete block and fabricated metal. The original building is a two-story structure built into the side of a hill with most of three sides covered by earth. The fourth side, opening to the north, provides the main entrance to the building.

The original building measures 262' (north to south) x 282' (east to west) on the ground floor; and 202' x 282' on the second floor. The building is 31' tall. There are no outside windows in the main building.

The first floor of Building 771 contains equipment for process and research operations. A central hallway, running north to south, and two transverse hallways divide this main processing floor into four major and two smaller areas. Each of the areas is further divided into rooms. Within the rooms, all of the plutonium processing equipment is contained in glove boxes. The purpose of these enclosures within enclosures was to confine particulate radioactive material and shield operating personnel from radiation.

The northwest part of the ground floor is divided into four areas. The west portion contains the building maintenance area, which supports the building's stationary equipment. The north-central portion contains locker rooms and showers. The northwest portion contains radiation monitoring space, decontamination showers, and laboratory space. The northeast portion contains the shift manager's office and other support offices.

The area in the southwest part of the ground floor is divided into two modules or separate work areas. The northern module contains laboratories used to verify the quality of the plutonium recovery processes. The southern module contains research areas where new and improved plutonium recovery processes were developed.

The east area of the ground floor is divided into two modules. The northeast module (Room 114) contains the plutonium and americium processing lines. In the original building, Room 114 originally contained offices and a cafeteria. The southeast module (Room 149) contains plutonium-processing lines.

The south area contains metallurgical research laboratories. The tunnel leading to area 776 of Building 776/777 is located adjacent to this area.

The second floor of Building 771 contains mechanical equipment for the heating, ventilating, and air conditioning and other utility systems, and a chemical preparation room to prepare chemicals that were transferred by gravity to the first floor process areas.

Three reinforced concrete box tunnels emerge from Building 771. A utility tunnel, measuring 3'-6" x 3'-6" x 170', leads to Building 774. An exhaust duct tunnel, measuring 8' x 10' x 104', leads to an exhaust stack. The exhaust tunnel floor is 1' thick, and the walls and roof slab are 10" thick. The exhaust duct has an access manhole adjacent to the exhaust stack. A tunnel, measuring 8' x 10' x 267', runs from Building 771 to the 776 section of Building 776/777 at a six percent grade. The walls and roof are 1' thick, and the floor is 1'-3" thick.

The reinforced concrete exhaust stack at the southeast corner of the building has an inside diameter of 10', the base is 19' underground, and the stack rises 150' aboveground. The stack

wall is 6" thick at the top and 11.5" thick at the base. The exhaust stack provides exhaust for the main filter plenum, which receives exhaust from the high-efficiency particulate air filtration system, the heating, ventilating, and air conditioning system, and the incinerator.

The heating, ventilating, and air conditioning system controls volume, temperature, and humidity of the atmosphere within areas of the building, while maintaining confinement of radioactive materials by means of pressure differential control and exhaust air filtration. Air pressure is increasingly negative from the hallways, to the rooms where radioactive materials are being used, to the glove boxes. Pressure differentials are maintained through the control of supply and exhaust air. Airborne plutonium would have to pass upstream against several stages of increasing pressure before it could escape to the environment. Automatic electrical interlocks, whose purpose is to prevent the building from becoming pressurized, are in service constantly.

Within Building 771 there are twelve systems that supply the building's airflow requirement of 210,000 to 250,000 cubic feet per minute under normal operating conditions. Outside air is taken in on the second floor through bird screens and pneumatically operated inlet dampers, and then filtered and washed. Standard air-washing equipment scrubs and cools the air. Airflow is controlled by a set of dampers at each supply fan, and backflow dampers are provided. Air is supplied through ductwork to the respective areas.

Since completion of the original building, six major additions have been constructed. This series of expansions brings the total area of the building to approximately 151,000 square feet. The first addition to Building 771, Building 771A was constructed in 1962. It is a one-story structure, approximately 41' x 110', on the north side of the main building. Offices and the cafeteria were moved into Building 771A when it was completed. This addition is separated from the process areas by a hallway and doors and has a separate ventilation system. Completed in 1966, the 771B office addition is a one-story building, measuring 41' x 81'. It was built on the north side of the main building, west of 771A. The Dock Number 1 addition was added to the northwest side of the main building in 1968. The maintenance shop on the west side of the main building was constructed in 1970, and is 60' x 77'. The waste packaging facility, Building 771C, was built in 1972, and is a one-story addition to the east side of Building 771, extending to the west side of Building 774.

A plenum deluge catch tank shed, built in 1974, was added on the west side of the original building adjacent to the maintenance shop addition. It is a one-story, 24' x 30' shed. Inside the shed is a 4,000-gallon-capacity filter drainage catch tank and support system to collect the water used while fighting a fire inside the filter plenums or the incinerator.

In addition to Building 771, the 771 complex includes five other buildings that house supporting facilities and operations, including hydrofluoric acid storage in Building 714, an emergency generator in Building 715, waste-drum storage in Building 770, fluorine storage in Building 772, and a guard post in Building 773. General plant systems provide Building 771 with electrical,

water, steam, sanitary sewer, liquid process waste, natural gas, telephone, fire, and security services.

Building Operations:

Operations in Building 771 included the chemical and physical operations for recovering plutonium and refining plutonium metal, plutonium chemistry and metallurgical research, and a radiochemical analytical laboratory. The storage of plutonium within the building has also been an important feature of the building's activities since operations began.

One of the primary objectives of the plutonium recovery and purification operation was to process waste material to remove plutonium and its byproducts until it could be safely and economically discarded. To provide a quantitative target by which to measure the discardability of wastes, limits were set to define concentrations of radioactive contaminants in materials, which would either be discarded or processed for recovery. These economic discard limits identified the concentration of a particular nuclear material present in a waste product below which it was not economically feasible to attempt recovery. Below the economic discard limits the material was disposed of as radioactive waste.

The first shipment of plutonium, in the form of plutonium nitrate, arrived at the Plant in May 1953 from the Hanford Plant in Richland, Washington. Later, plutonium also came from the Hanford Plant in the form of metal buttons. Occasionally, plutonium nitrate feed was received from the Oak Ridge Reservation in Oak Ridge, Tennessee. Around 1959, these shipments dropped off, and the majority of the plutonium feed for recovery and purification operations was recycled material, either from site returns (weapons returned to the plant for upgrade, reprocessing or retirement), the foundry, or the waste products from the recovery operation itself. Some of the plutonium, which went through the system at this time, came from outside sources in the form of plutonium dioxide. Later, shipments of plutonium were received in the form of metal buttons from the Savannah River site.

The original batch-oriented plutonium recovery process handled scrap material generated by the limited on-site plutonium casting and machining operations. A minimal amount of plutonium from site returns was also processed. This procedure involved heating and agitating a mixture of nitric acid and plutonium residues. It was very labor intensive, and allowed corrosive fumes to be released, which caused problems for the glove box handling and filtration systems. Continuously operating automatic control systems were later introduced to increase the recovery capacity of the facility and to decrease radiation exposure to operating personnel.

The plutonium recovery and purification process can be described in terms of slow and fast processes. The slow process received materials with relatively more impurities, and required pre-processing before entering the fast process. The fast process converted plutonium nitrate solution from a liquid into a solid and then to a metal.

Originally, almost all plutonium-bearing materials went through slow recovery operations. Feed material generally consisted of reactor-generated plutonium, site returns, metal chips, and foundry scrap and other high-purity metal residues generated by machining operations. These materials were eventually introduced into the fast process for conversion to a solid and reduction to metal. After the introduction of the molten salt extraction process in 1968, some of the essentially pure plutonium metal, such as the metal from site returns, went through molten salt extraction to remove americium ingrowth and were then forwarded directly to plutonium foundry operations in Building 777. The need for those materials to go through the chemical recovery process was eliminated. As a result, the slow process began to receive materials such as effluents and waste products from the fast process, rags, paper goods, sweepings, and other wastes.

There were three primary recovery processes in the slow process: cation exchange, dissolution, and anion exchange. Cation exchange feed came from lab wastes and the chloride salt process. The main reason for the cation exchange operation was to remove chlorides that could create severe corrosion problems for the anion exchange equipment.

The dissolution process received its feed, in part, in the form of incinerator ash. The feed may also have been made up of plutonium dioxide from oxidation operations in Building 771 and other buildings. In dissolution, steam coils were immersed in liquid to heat the solution. This slurry flowed through a series of dissolvers to a horizontal-pan vacuum filter. The filter separated the undissolved solids from the solution. Solids were scraped from the filter, dried on a hot plate, and packaged as waste for removal from the glove box. The effluent went to anion exchange.

Prior to 1960, dissolution was followed by solvent extraction then by cation exchange. Around 1960, solvent extraction was eliminated from the recovery process line because the materials going through the recovery process were becoming more varied. The process was replaced by anion exchange that was better able to handle the variety of feed material.

Anion exchange primarily received effluents from the fast process precipitation operation, with the dissolution and cation exchange operations contributing to a lesser degree. The anion exchange process purified and concentrated plutonium-bearing nitric acid solutions to make them acceptable as feed for conversion to metal. The plutonium nitrate solutions were pumped through glass columns containing anion exchange resin. The solution was then concentrated in a steam-heated, natural-convection evaporator. The concentrated solution, called "bottoms," was transferred to tanks.

The fast plutonium recovery process involved an aqueous dissolution process followed by precipitation, calcination, hydrofluorination, and reduction steps, to return the solute back into metallic form. Nitric acid was the primary chemical used in the dissolution steps, although the operation also involved aluminum nitrate, calcium fluoride, and water.

After dissolution in the fast process, the nitrate mixture underwent a peroxide precipitation step, which converted the plutonium in solution to a solid form and achieved some purification of the plutonium from metallic elements, notably americium. Relatively pure plutonium nitrate solutions received from oxide dissolution, anion exchange, and feed evaporation were blended and adjusted to the proper pH and plutonium concentration before entering the peroxide precipitation process. The feed solution was pumped into a refrigerated, stirred reactor called a digestor. Hydrogen peroxide solution was also fed into the digestor. Plutonium peroxide precipitation occurred in the digestor and crystals were allowed to grow as the plutonium peroxide slurry cascaded through the digestors and into a rotary drum filter basin. Vacuum applied to the filter caused the plutonium peroxide to collect on the filter surface. The plutonium peroxide cake that collected on the rotary drum was removed from the filter wheel, collected in containers, and transferred to the calciner. Liquid wastes generated by the fast process were either transferred to the slow process or sent to Building 774 for treatment.

The plutonium peroxide was heated (calcined) to convert it to plutonium oxide. The calcination process drove out residual water and nitric acid, leaving a dry, powdered product. The dried cake was collected, screened, and weighed in batches. Every third batch was sampled and analyzed for impurities for process control. Batches were stored in approved containers in racks in a glove box while awaiting hydrofluorination.

Hydrofluorination converted plutonium oxide to plutonium tetrafluoride by mixing with hydrogen fluoride gas in a continuous rotary-tube hydrofluorinator. This hydrofluorinator was installed in 1963 to increase control and consistency in this step of the process. The plutonium tetrafluoride product was collected, weighed, and transferred in batches to the reduction process. The hydrofluorination process produced high neutron radiation, which emanated from plutonium tetrafluoride.

Reduction of the plutonium tetrafluoride to plutonium metal was achieved by interaction with calcium metal in an induction-heated reduction vessel. The reduction vessel was evacuated and purged with argon to provide an inert atmosphere. The reduction vessel was heated by induction until the reduction reaction took place. The plutonium metal button was separated from the crucible, sand, and calcium fluoride slag. It was cleaned, sampled, and packaged for storage, where it was held until the analysis was complete, and then sent to the foundry for weapons component fabrication.

Incineration

In 1956, an incinerator was added to Building 771 to handle the large quantities of contaminated combustible wastes generated at the Plant. These wastes were contaminated with small amounts of plutonium and americium.

The incinerator was comprised of three chambers: a firebox where combustibles were initially introduced to the system; a main burner chamber where ashes that fell through the firebox grate continued to burn; and an afterburner section. Wastes such as paper, plastic, rags, rubber, and

some sludges that had plutonium concentrations lower than the economic discard limits were added into the main burner chamber and burned. The ash dropped through the grate into a catch pan. The ash was removed, cooled, and transferred to an adjacent glovebox for crushing in preparation for dissolution. The incinerator was originally fired by natural gas. After a few explosions caused by the afterburner, wastes were used to fire the incinerator. Products of this process were an ash that contained plutonium concentrations ranging from five to ten percent by weight, and a combustion product off-gas.

Off-gases from the incinerator were passed through two heat exchangers for cooling. The gases then entered a spray chamber and were sprayed with a caustic solution to neutralize the gases and knock out the fly ash. The gases passed through a series of high-efficiency particulate air filters, into an exhaust tunnel and out through the exhaust stack.

During June and December of each year, Building 771 was shut down and inventoried. During the inventory shutdown in December of 1988, glove boxes were being steam cleaned at high temperature for removal of built-up plutonium. The heat from this operation exited the building through the high-efficiency particulate air filter system and exhaust stack. A passing aircraft registered the hotspot on film. Officials with the USEPA believed that the incinerator was illegally being used during a shutdown. The USEPA used this opportunity to convince authorities to issue a warrant to enter the Plant and investigate the allegation. The investigation raised safety concerns at the Plant and ultimately led to the curtailment of operations at the Plant in 1989.

Shipping and Receiving
Shipping, receiving, and measurement of the amount of radioactivity (counting) of containerized materials entering or exiting Building 771 were performed in Building 771C. Building 771C was separated from the remainder of Building 771 by an airlock. Typical operations in Building 771C included temporary storage of materials in containers and counting of individual containers prior to transfer into or out of Building 771. Containers remained closed while in temporary storage. Counting was a non-destructive activity that occurred while the container was closed.

Other Operations
Seven categories of waste solutions were shipped to Waste Treatment in Building 774 from Plutonium Recovery in Building 771. They were anion column effluent; distillate; steam condensate and cooling water; basic, acid chloride, and analytical laboratory waste; and oxalate filtrate. All of these solutions were collected in tanks in Building 771 where they were mixed, sampled, and analyzed for their plutonium, uranium, and americium content. If the plutonium concentration was below the economic discard limits, the contents of the tank were transferred to the waste treatment facility. If the concentration was above the limit, the tank contents were reprocessed.

Americium extraction, purification, and recovery began in 1957. From 1957 to 1967, the feed for the process was the filtrate from the peroxide precipitation step on the plutonium recovery

line. In 1967, the feed for americium recovery became the salts from the molten salt extraction process. The original recovery process evaporated the plutonium peroxide precipitation effluent and separated the americium that remained in solution by anion exchange. When molten salt extraction salts became the feed source, the recovery process changed to include dissolution, hydroxide precipitation, and anion exchange. In 1973, the hydroxide precipitation step was replaced with a cation exchange procedure that reduced exposure of personnel to penetrating radiation. Other measures to reduce the exposure of personnel included shielding the processing equipment with lead. Personnel wore lead aprons and gloves, and personnel minimized their time in close proximity to the recovery operation. Starting in 1976, molten salt extraction salts went to a salt scrub process instead of to americium recovery. By 1979, the demand for americium was so low that it was no longer economically feasible to recover and purify it. Americium recovery and purification operations were shut down in 1980, and americium work was limited to that required to extract americium from the plutonium metal in site returns.

Research and development groups in Building 771 supported and developed methods for recovering, separating, and purifying actinides from acidic waste streams. Research and development for actinide element separation and purification was performed using laboratory-scale, pilot-scale, and production-scale equipment. This same research was done for other USDOE facilities, design agencies, and governmental departments.

The plutonium metallurgy group assisted the design agency and Plant production in the development of processes that required metallurgical production of materials and related manufacturing techniques. Supporting operations included metallography, x-ray diffraction, tensile testing, dilatometry, and density measurements. Plutonium metallurgy operations consisted of casting, heat-treating, rolling, forming, forging, sizing, and swaging. Facilities for tensile testing and powder metallurgy were also located in Building 771.

The Building 771 Analytical Laboratory received or prepared samples of process line liquids and solids. These samples were analyzed for plutonium, americium, uranium, neptunium, and other radioactive isotopes. Special recovery operations processed scrap metal and oxide residues containing elements and isotopes that would contaminate or dilute the War Reserve plutonium stream.

Operations Since 1989

Following the raid 1989, production at the Plant was curtailed. In 1992, the mission of the Plant was officially changed from weapons components production to environmental restoration and waste management. The mission of Building 771 was changed at that time to plutonium stabilization operations. The building was scheduled for demolition as a part of site cleanup activities.

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